

Second Class – Chief

Statutes and Rules

326B.95 DEFINITIONS.

Certificate of inspection. “Certificate of inspection” means a sticker attached to the boiler or pressure vessel which documents the month and year of the inspection and the employer of the inspector performing the inspection.

Certificate of registration. “Certificate of registration” means a document that has been made available on the department's Web site that lists all registered boilers and pressure vessels at a location, including the last inspection date, the certificate expiration date, and the maximum allowable working pressure for each boiler or pressure vessel.

High-pressure boiler. “High-pressure boiler” means a boiler operating at a steam or other vapor pressure in excess of 15 psig, or a water or other liquid boiler in which the pressure exceeds 160 psig or the temperature exceeds 250 degrees Fahrenheit.

Inspection due date. “Inspection due date” means the last possible date that the inspection can be completed within the time limits in this chapter.

Insurance company boiler inspector. “Insurance company boiler inspector” means a national board-commissioned inspector who holds a current certificate of competency issued by the state.

Low-pressure boiler. “Low-pressure boiler” means a boiler operating at a steam or other vapor pressure of 15 psig or less, or a water or other liquid boiler in which the pressure does not exceed 160 psig and the temperature does not exceed 250 degrees Fahrenheit.

National board. “National board” means the National Board of Boiler and Pressure Vessel Inspectors, which is an organization comprised of chief Inspectors for the states, cities, and territories of the United States and provinces and territories of Canada.

National Board commissioned inspector. “National board commissioned

inspector” means an individual who has been examined and found qualified to inspect in-service boilers and pressure vessels by the national board, and who holds a current commission issued by the national board.

National Board Inspection Code; NBIC. “National Board Inspection Code” or “NBIC” means a three-part technical document that is written and published by the national board detailing the installation, inspection, and repair of boilers and pressure vessels.

Operation. “Operation” means the on-site act of manipulating, monitoring, and testing of boilers and their appurtenances by a properly licensed engineer or an apprentice under the direct supervision of the properly licensed engineer.

Psig. “Psig” means pounds per square inch gauge.

Remote monitoring. “Remote monitoring” means the act of viewing or overseeing the boiler or boiler plant operating parameters and conditions from a remote location.

Repair. “Repair” means the work necessary to restore a boiler or pressure vessel to a safe and satisfactory operating condition, as defined in National Board Inspection Code, part 3, section 9.

State boiler inspector. “State boiler inspector” means a national board commissioned boiler inspector who holds a current certificate of competency and a current chief grade A boiler operator's license.

326B.958 INSPECTION AND REGISTRATION.

Subdivision 1. Inspection.

(a) Every owner, lessee, or other person having charge of boilers or pressure vessels subject to inspection under sections 326B.956 to 326B.998 shall cause them to be inspected by the department unless specifically excepted by section 326B.988 or 326B.99. Inspectors shall subject all boilers to a thorough internal and external examination according to the standards in sections 326B.964 and 326B.966.

(b) Anyone who installs a boiler must ensure that the boiler is inspected by the department after installation is complete and before the boiler is placed in operation. Inspection fees pursuant to section 326B.986 associated with this initial inspection are the responsibility of the installer.

(c) The owner of a boiler must ensure that the boiler is inspected at least annually after the initial inspection, except as provided in sections 326B.956 and 326B.96.

(d) The owner of a pressure vessel not specifically excepted by section 326B.988 must ensure that the pressure vessel is inspected at least every two years.

Subd. 1a. **Certificate of inspection.** After inspecting the boiler or pressure vessel, the boiler inspector shall document the condition of the boiler or pressure vessel. If the boiler or pressure vessel meets the inspection requirements in sections 326B.964 and 326B.966, the inspector shall attach a label or sticker to the boiler or pressure vessel indicating the month and year inspected and the name of the inspection agency. This label is the inspection certificate and shall indicate that the inspected boiler or pressure vessel is found to be safe and suitable for use. The boiler inspector shall directly attach a tag to a newly installed boiler that displays a unique identification number.

Subd. 1b. **Defects in boilers or pressure vessels.** If, upon inspecting a boiler or pressure vessel, the boiler inspector determines that the boiler or pressure vessel does not meet the requirements in sections 326B.964 and 326B.966, the inspector shall notify the owner or operator in writing of any defect in the boiler or pressure vessel. The boiler or pressure vessel shall not be operated if the inspector determines that the boiler or pressure vessel is unsafe. The boiler or pressure vessel shall not be operated until these unsafe defects have been corrected and verified by the inspector. If the boiler inspector finds that a boiler is being operated by an unlicensed or improperly licensed person, operation of the boiler shall cease until all operators are properly licensed according to section 326B.978. If circumstances warrant continued operation, the boiler inspector may, at the discretion of the boiler inspector, give approval for continuing operation of the boiler for a specific period of time, not to exceed 30 days.

Subd. 2. **Registration.** Every owner, lessee, or other person having charge of a boiler or pressure vessel subject to inspection under sections 326B.93 to 326B.998, except historical boilers under section 326B.956, shall register the boiler or pressure vessel with the department at the time of the initial inspection described in subdivision 1. The registration shall be renewed annually for each boiler or pressure vessel on record with the department.

Subd. 3. **Certificate of registration.** The department shall issue an electronic certificate of registration that lists the registered boilers and pressure vessels at the location, expiration date of the certificate of registration, last inspection date of each registered boiler and pressure vessel, and maximum allowable working pressure for each registered boiler and pressure vessel. This certificate shall be available to be printed by the owner, lessee, or other person having charge of the registered boiler or pressure vessel.

326B.964 STANDARDS OF INSPECTION.

The engineering standards of boilers and pressure vessels for use in this state shall be those established by Minnesota Rules, chapter 5225, and by the current edition of and addenda to the ASME Code, the National Board Inspection Code, and the National Fire Protection Association’s standard NFPA 85 (Boiler and Combustion Systems (Hazard Code)), as they apply to the construction, operation and care of, in-service inspection and testing, and controls and safety devices.

326B.97 INSPECTION OF BOILERS AND PRESSURE VESSELS.

The owner, lessee, or other person having control of a boiler or pressure vessel shall allow inspectors full access to the boiler or pressure vessel. Every engineer operating a boiler shall assist the inspector during the examination, and indicate to the inspector any known defects in the boilers, pressure vessels, steam engines, and turbines.

326B.972 LICENSE REQUIREMENT.

(a) To operate a boiler, steam engine, or steam turbine an individual must have received a license for the grade covering that boiler, steam engine, or steam turbine. Except for licenses described in section 326B.956 and except for provisional licenses described in paragraphs (d) to (g):

- (1)** all initial licenses shall be for two years;
- (2)** the commissioner shall in a manner determined by the commissioner, without the need for any rulemaking under chapter 14, phase in the renewal of licenses from one year to two years; and
- (3)** by June 30, 2011, all licenses shall be two-year licenses.

(b) For purposes of sections 326B.93 to 326B.998, “operation” means the act of manipulating and monitoring boilers or appurtenances for their intended purpose and to ensure safety, except that operation does not include remote monitoring of an automatic boiler. When a boiler is monitored from a remote location, the only function that may be performed remotely upon the boiler is an emergency shut down in alarm situations.

(c) No individual under the influence of illegal drugs or alcohol may operate a boiler, steam engine, or steam turbine or monitor an automatic boiler.

(d) The commissioner may issue a provisional license to allow an employee of a high pressure boiler plant to operate boilers greater than 500 horsepower at only that boiler plant if:

(1) the boiler plant has a designated chief engineer in accordance with Minnesota Rules, part 5225.0410;

(2) the boiler plant employee holds a valid license as a second-class engineer, Grade A or B;

(3) the chief engineer in charge of the boiler plant submits an application to the commissioner on a form prescribed by the commissioner;

(4) the chief engineer in charge of the boiler plant and an authorized representative of the owner of the boiler plant both sign the application for the provisional license;

(5) the owner of the boiler plant has a documented training program with examination for boilers and equipment at the boiler plant to train and test the boiler plant employee; and

(6) if the application were to be granted, the total number of provisional licenses for employees of the boiler plant would not exceed the total number of properly licensed first-class engineers and chief engineers responsible for the safe operation of the boilers at the boiler plant.

(e) A public utility, cooperative electric association, generation and transmission cooperative electric association, municipal power agency, or municipal electric utility that employs licensed boiler operators who are subject to an existing labor contract may use a provisional licensee as an operator only if using the provisional licensee does not violate the labor contract.

(f) A provisional license is valid for 36 months from the date of issue, unless revoked before the expiration date. A provisional license may not be renewed.

(g) The commissioner may issue no more than two provisional licenses to any individual within a four-year period.

326B.974 SCHOOL ENGINEER.

Subdivision 1. **License required.** Any custodial engineer employed by a school whose duties include the operation of a boiler shall be licensed pursuant to section 326B.978, to operate the particular class of boiler used in the school.

Subd. 2. **School district training.** A school district shall allow to occur annually at least eight hours of training related to boiler operation to a licensee described in subdivision 1. The training must be administered by a licensed first or chief class engineer during the licensee's normal working hours. Two hours of the required training shall occur in the boiler room and must include demonstration of tasks associated with operating boilers. The tasks associated with operating boilers acceptable for the training must be from the list of approved tasks supplied by the chief boiler inspector. The administrator of the training shall receive training credit for time spent administering training pursuant to this subdivision. **(See page ___ for list of tasks)**

326B.978 EXAMINATIONS; CLASSIFICATIONS; QUALIFICATIONS.

Subdivision 1. **Engineers, classes.**

Engineers shall be divided into four classes:

- (1)** Chief engineers; Grade A, Grade B, and Grade C.
- (2)** First class engineers; Grade A, Grade B, and Grade C.
- (3)** Second class engineers; Grade A, Grade B, and Grade C.
- (4)** Special engineers.

Subd. 2. **Applications.** Any individual who desires an engineer's license shall submit an application on a written or electronic form prescribed by the commissioner, at least 15 days before the requested exam date. If the commissioner approves the applicant for examination, the applicant may take the examination on one occasion within one year from the date the commissioner receives the application.

Subd. 3. **Examinations.** Each applicant for a license must pass an examination developed and administered by the commissioner. The examinations shall be of sufficient scope to establish the competency of the applicant to operate a boiler of the applicable license class and grade.

Subd. 4. **Continuing education.** The commissioner may require continuing education prior to the renewal of any license. Before requiring continuing education, the commissioner shall adopt rules that specify the continuing education requirements.

Subd. 5. **High- and low-pressure boilers.** For the purposes of this section and section 326B.97, high-pressure boilers shall mean boilers operating at a steam or other vapor pressure in excess of 15 p.s.i.g., or a water or other liquid boiler in which the pressure exceeds 160 p.s.i.g. or a temperature of 250 degrees Fahrenheit. Low-pressure boilers shall mean boilers operating at a steam or other vapor pressure of 15 p.s.i.g. or

less, or a water or other liquid boiler in which the pressure does not exceed 160 p.s.i.g. or a temperature of 250 degrees Fahrenheit.

Subd. 6. **Chief engineer, Grade A.** An individual seeking licensure as a chief engineer, Grade A, shall be at least 18 years of age and have experience which verifies that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of boilers, steam engines, and turbines and their appurtenances; and, before receiving a license, the applicant shall take and subscribe an oath attesting to at least five years actual experience in operating the boilers except as provided in subdivision 18, including at least two years' experience in operating the engines or turbines except as provided in subdivision 18.

Subd. 7. **Chief engineer, Grade B.** An individual seeking licensure as a chief engineer, Grade B, shall be at least 18 years of age and have habits and experience which justify the belief that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of boilers and their appurtenances; and, before receiving a license, the applicant shall take and subscribe an oath attesting to at least five years' actual experience in operating those boilers except as provided in subdivision 18.

Subd. 8. **Chief engineer, Grade C.** An individual seeking licensure as a chief engineer, Grade C, shall be at least 18 years of age and have habits and experience which justify the belief that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of low-pressure boilers and their appurtenances, and before receiving a license, the applicant shall take and subscribe an oath attesting to at least five years of actual experience in operating the boilers except as provided in subdivision 18.

Subd. 9. **First-class engineer, Grade A.** An individual seeking licensure as a first class engineer, Grade A, shall be at least 18 years of age and have experience which verifies that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of boilers, engines, and turbines and their appurtenances of not more than 500 horsepower or to operate as a shift engineer in a plant of unlimited horsepower. Before receiving a license, the applicant shall take and subscribe an oath attesting to at least three years actual experience in operating the boilers, including at least two years' experience in operating such engines or turbines except as provided in subdivision 18.

Subd. 10. **First-class engineer, Grade B.** An individual seeking licensure as a first class engineer, Grade B, shall be at least 18 years of age and have habits and experience which justify the belief that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of boilers of not more than 500 horsepower or to operate as a shift engineer in a plant of unlimited horsepower. Before receiving a license the applicant shall take and subscribe an oath

attesting to at least three years' actual experience in operating the boilers except as provided in subdivision 18.

Subd. 11. **First-class engineer, Grade C.** An individual seeking licensure as a first class engineer, Grade C, shall be at least 18 years of age and have habits and experience which justify the belief that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of low-pressure boilers and their appurtenances of not more than 500 horsepower or to operate as a shift engineer in a low-pressure plant of unlimited horsepower. Before receiving a license, the applicant shall take and subscribe an oath attesting to at least three years' actual experience in operating the boilers except as provided in subdivision 18.

Subd. 12. **Second-class engineer, Grade A.** An individual seeking licensure as a second-class engineer, Grade A, shall be at least 18 years of age and have experience which verifies that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of boilers, engines, and turbines and their appurtenances of not more than 100 horsepower or to operate as a shift engineer in a plant of not more than 500 horsepower, or to assist the shift engineer, under direct supervision, in a plant of unlimited horsepower. Before receiving a license the applicant shall take and subscribe an oath attesting to at least one year of actual experience in operating the boilers, including at least one year of experience in operating the engines or turbines except as provided in subdivision 18.

Subd. 13. **Second-class engineer, Grade B.** An individual seeking licensure as a second-class engineer, Grade B, shall be at least 18 years of age and have habits and experience which justify the belief that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of boilers of not more than 100 horsepower or to operate as a shift engineer in a plant of not more than 500 horsepower or to assist the shift engineer, under direct supervision, in a plant of unlimited horsepower. Before receiving a license the applicant shall take and subscribe an oath attesting to at least one year of actual experience in operating the boilers except as provided in subdivision 16 or 18.

Subd. 14. **Second-class engineer, Grade C.** An individual seeking licensure as a second-class engineer, Grade C, shall be at least 18 years of age and have habits and experience which justify the belief that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of low-pressure boilers and their appurtenances of not more than 100 horsepower or to operate as a shift engineer in a low-pressure plant of not more than 500 horsepower, or to assist the shift engineer, under direct supervision, in a low-pressure plant of unlimited horsepower. Before receiving a license, the applicant shall take and subscribe an oath attesting to at least one year of actual experience in operating the boilers except as provided in subdivision 18.

Subd. 15. Special engineer.

(a) An individual seeking licensure as a special engineer shall be at least 18 years of age and have habits and experience which justify the belief that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of boilers and their appurtenances of not more than 50 horsepower or to operate as a shift engineer in a plant of not more than 100 horsepower, or to serve as an apprentice in any plant under the direct supervision of the properly licensed engineer.

(b) An individual seeking licensure as a special engineer who is at least 16 years of age but less than 18 years of age must be enrolled in a course approved by the commissioner, and have habits and experience that justify the belief that the individual is competent to take charge of and be responsible for the safe operation and maintenance of all classes of boilers and their appurtenances of not more than 50 horsepower or to operate as a shift engineer in a plant of not more than 100 horsepower, or to serve as an apprentice in any plant under the direct supervision of the properly licensed engineer.

Subd. 16. Current boiler operators. Any individual operating a boiler other than a steam boiler on or before April 15, 1982, shall be qualified for application for the applicable class license upon presentation of an affidavit furnished by an inspector and sworn to by the individual's employer or a chief engineer. Except as provided in subdivision 18, the applicant must have at least the number of years of actual experience specified for the class of license requested and pass the appropriate examination.

Subd. 17. Rating horsepower. For the purpose of rating boiler horsepower for engineer license classifications only: ten square feet of heating surface shall be considered equivalent to one boiler horsepower for conventional boilers and five square feet of heating surface equivalent to one boiler horsepower for steam coil type generators.

Subd. 18. Educational offset. Notwithstanding the experience requirements in subdivisions 6 to 16, the commissioner may by rule establish educational equivalencies that an applicant may meet instead of a portion of the specified operating experience.

Rules

LICENSES

5225.0010 SCOPE.

This chapter addresses the manufacture, installation, repair, operation, safety, and inspection of boilers, pressure vessels, appurtenances, and boats for hire as defined in parts 5225.0050 to 5225.8700 pursuant to Minnesota Statutes, chapter 183.

5225.0050 DEFINITIONS.

Subpart 1. **Scope.** For the purposes of this chapter and Minnesota Statutes, sections 326B.952 to 326B.998, the following terms have the meanings given them.

Subp. 2. **Appurtenance.** "Appurtenance" means equipment that is integral to the operation of the boiler as specified in Sections I, IV, VI, and VII of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code as incorporated by reference in part 5225.0090.

Subp. 3. **Authorized inspector.** "Authorized inspector" means a commissioned inspector with a Minnesota certificate of competency who also possesses either an A or B endorsement and is regularly employed by an authorized inspection agency or the jurisdiction.

Subp. 4. **Boiler.** "Boiler" means a vessel in which steam or other vapor, hot water or other hot liquid is generated for use external to itself.

Subp. 5. **Boiler plant.** "Boiler plant" means all boilers on a common header and their related appurtenances.

Subp. 6. **Chief boiler inspector.** "Chief boiler inspector" means the chief of the division of boiler inspection as defined in Minnesota Statutes, section 183.375, subdivision 2, appointed by the commissioner.

Subp. 7. **Chief engineer.** "Chief engineer" means the properly licensed engineer required to be in charge of and responsible for the safe operation of a boiler plant.

Subp. 8. **Commissioned inspector.** "Commissioned inspector" means one who has passed the exam of the National Board of Boiler and Pressure Vessel Inspectors and possesses a valid National Board Commission and is employed by an authorized inspection agency or the jurisdiction.

Subp. 9. **Commissioner.** "Commissioner" means the commissioner of the department.

Subp. 10. **Department.** "Department" means the Department of Labor and Industry.

Subp. 11. **Direct supervision.** "Direct supervision" by the properly licensed operating engineer of a boiler plant means oversight of an apprentice's activities on a boiler including attendance at the boiler plant at all times.

Subp. 12. **Division.** "Division" means the Division of Boiler Inspection.

Subp. 13. **High pressure boiler.** "High pressure boiler" means power boiler as defined in Section I of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code.

Subp. 14. **Operating engineer.** "Operating engineer" means a properly licensed individual who operates and maintains boilers and their appurtenances.

Subp. 15. **Operating experience.** "Operating experience" means activities in boiler operations and maintenance that include training, observation, and personal participation.

Subp. 16. **Operation.** "Operation" means the act of manipulating and monitoring, except as provided in Minnesota Statutes, section 326B.972, paragraph (b), boilers or appurtenances to assure safe operation for the intended purpose in accordance with this chapter.

Subp. 17. **Repair firm.** "Repair firm" means a company or organization that holds a current "R" repair certificate of authorization issued by the National Board of Boiler and Pressure Vessel Inspectors and performs welded repairs or alterations on boilers or pressure vessels.

Subp. 18. **Shift engineer.** "Shift engineer" means the operating engineer responsible to the chief operating engineer in charge of and responsible for the safe operation of a boiler plant in the absence of the chief engineer.

5225.0100 APPLICATION FOR OPERATING ENGINEER LICENSE.

Any person desiring to take an examination for a license as an operating engineer shall make written application under oath, on blanks furnished by the division. The application shall be accompanied by a corroborating affidavit of at least one employer or an operating engineer possessing not less than a second class engineer's license, certifying to the applicant's operating experience as stated in the application. If affidavits are not obtainable, satisfactory evidence of the applicant's operating experience must be furnished.

5225.0400 BASIC LICENSE REQUIREMENT AND DUTY.

No person shall have charge of or operate any boiler or boiler plant who does not possess a license of the class required to operate the boiler or boiler plant.

It is the duty of the owner of a boiler or boiler plant and the chief engineer and all boiler inspectors, including those employed by insurance companies, to promptly report to the chief boiler inspector, any boiler or boiler plant in which the engineer has no license or a license of a lower class than that required by law for the horsepower of the boiler or boiler plant.

5225.0410 HIGH PRESSURE BOILER CHIEF ENGINEER.

Each boiler plant over 300 horsepower must have designated a chief class operating engineer of proper grade as the chief engineer of the plant. The chief engineer shall have the responsibility for ensuring the safe operation and maintenance of the boiler plant. The requirements of this section are not met unless the chief engineer has the authority to make decisions to ensure that safety. The chief engineer shall work on the premises at least four hours per day, five days per week, with the exception of excused absences, such as vacation, sick leave, and holiday time.

5225.0500 EXAMINATIONS.

Subpart 1. **Preparation of written examination.** The examination questions will be prepared by the chief boiler inspector. All examinations must be written unless the applicant is unable to read, or write, in which case the examination will be oral for a

special or second class license. The right to an oral examination for a first or chief class license shall be determined by the chief boiler inspector based on the applicant's ability to demonstrate reading comprehension of statutes, rules, technical boiler operation manuals, and safety warnings. Decisions of the chief boiler inspector regarding application for oral examination may be appealed to the commissioner under part 5225.3200. A written record of the examination shall be made, and examination papers will be kept on file for a period of at least one year.

Subp. 2. **Minimum grade.** No new license of any class will be granted to any applicant who fails to obtain a score of at least 70 percent in an examination.

5225.0550 EXPERIENCE REQUIREMENTS AND DOCUMENTATION FOR LICENSURE AS AN OPERATING ENGINEER.

Subpart 1. **Compliance requirements.** All applicants must comply with this chapter and Minnesota Statutes, sections 326B.952 to 326B.998. The experience requirements are detailed in this part and documentation requirements are detailed in subpart 9. Applicants with previous experience in a jurisdiction requiring licensure must show proof of compliance with the licensure requirements of that jurisdiction in order to receive credit for the experience. All applicants for licensure as an operating engineer or hobby operating engineer, shall provide documentation of operating experience for the level of class/grade applied for in accordance with subparts 2 to 8. To be acceptable for this purpose, operating experience must have occurred within the ten years prior to the license application. The chief boiler inspector may allow earlier operating experience if that experience is pertinent to current operations.

Subp. 2. **Special class experience requirements.** A special class license requires only a signed application form. No previous experience is necessary.

Subp. 3. **Second class experience requirements.** A second class license requires one year of operating experience, documented as described in subpart 9, on a boiler of proper size under Minnesota Statutes, section 326B.978, subdivisions 12 to 14.

Subp. 4. **First class experience requirements.** A first class license requires three years of operating experience, documented as described in subpart 9, on a boiler of proper size under Minnesota Statutes, section 326B.978, subdivisions 9 to 11.

Subp. 5. **Chief class experience requirements.** A chief class license requires five years of operating experience, documented as described in subpart 9, on a boiler of proper size which must include one year as a licensed first class engineer, under Minnesota Statutes, section 326B.978, subdivisions 6 to 8.

Subp. 6. **Requirements for Grade A licensure.** The requirements for a Grade A license are:

A. Second Class: one year of operating experience on a high pressure boiler, documented as described in subpart 9, which must include one year of operation of a steam engine or turbine.

B. First Class: three years of operating experience on a high pressure boiler, documented as described in subpart 9, of which at least two years must include operation of a steam engine or turbine.

C. Chief Class: five years of operating experience on a high pressure boiler, documented as described in subpart 9, including at least two years of operation of a steam engine or turbine.

Subp. 7. [Repealed, 18 SR 614]

Subp. 8. **Hobby operating engineer license experience and documentation.**

A. Experience. An applicant for a hobby operating engineer license must have at least 25 hours operating experience on a steam traction engine or hobby boiler under the supervision of an operating engineer.

B. Documentation. An affidavit of experience must be signed by a person with sufficient knowledge of the applicant's operating experience prior to the applicant taking the examination. The person signing the affidavit must have observed the applicant operating the steam traction engine or hobby boiler and must possess either a valid Minnesota hobby operating engineer license or a valid second class, or higher, Minnesota operating engineer's license. However, if the experience claimed is acquired from outside the state of Minnesota, documentation under the last paragraph of subpart 9 applies.

Subp. 9. **Supporting documentation.** Acceptable forms of documentation of experience are:

A. notarized affidavits, prescribed by the department and signed by the owner, employer, or a person possessing a valid Minnesota second class or higher operating engineer license;

B. documentation from the military or maritime service verifying actual operating experience; or

C. a notarized letter from an employer on the employer's business stationery containing verification of operating experience sufficient to determine the appropriate class and grade of license for which the applicant may apply.

If the documentation described in items A to C cannot be obtained, other forms of documentation in which the information can be verified and which are sufficient to determine the appropriate class and grade, may be submitted to the chief boiler inspector for consideration.

Subp. 10. **Year defined.** For purposes of this chapter, a "year" is at least 2,000 hours. However, in the case of low pressure heating boilers, a year is defined as a 12-month period which includes the heating season operating, and the remainder of the year maintaining, the low pressure boiler.

5225.0600 PROHIBITION AGAINST FALSE STATEMENTS IN APPLICATION.

Any material false statement in an application or affidavit such that the license would not have been granted if the accurate information had been provided, shall render the license void. The license shall not be determined to be void until the license holder has been provided with the opportunity for a meet and confer conference and/or an administrative hearing pursuant to part 5225.0880, subpart 5, and the requirements of the Administrative Procedure Act, and the charge of a materially false statement is upheld.

5225.0900 DISPLAY OF LICENSE.

Licenses granted must be displayed in a conspicuous place in the engine or boiler room. Boiler plants operated by a contract operating engineer must have a copy of the operating engineer's license of each person who may be operating the boiler posted in each boiler room.

5225.1000 BOILER HORSEPOWER RATING.

In rating the horsepower of a boiler plant, inspectors shall use the horsepower of each boiler and compute the total horsepower of all boilers connected to the header, whether all the boilers are in use or not.

Where the heating surface cannot be discerned, the boiler horsepower shall be determined by calculating Btu boiler-rated input divided by 67,000.

For purposes of operating engineer license requirements, boiler horsepower for conventional boilers and steam coil type generators is determined as provided in Minnesota Statutes, section 326B.978, subdivision 17. For electrically operated boilers for this purpose, ten kilowatts equal one boiler horsepower.

5225.1110 BOILER OPERATION STANDARDS; ALL PLANTS.

Subpart 1. **Safe boiler operation.** All boilers, unless specifically exempted by Minnesota Statutes, section 326B.988, must be operated, maintained, and attended by an operating engineer in a prudent and attentive manner to avoid endangering human life and property. At a minimum, all operating boilers must be checked by an operating engineer in compliance with this chapter. Specific minimum attendance requirements for hobby boilers are given in part 5225.1140 and specific minimum attendance requirements for high pressure plants are given in part 5225.1180.

In determining whether a boiler is operated, maintained, and attended in a prudent and attentive manner, the division and the chief engineer or operating engineer shall consider the recommendations of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section VI, for low pressure and Section VII, for high pressure along with the following additional factors:

- A. the size or capacity of the boiler plant;
- B. the condition of boilers and appurtenances;
- C. the frequency of boiler checks and past maintenance history;
- D. the extent of public occupancy of the building containing the boiler plant;
- E. the operating service conditions, including weather;
- F. compliance with other statutes and rules of this division; and
- G. any other factor which would adversely affect the safety of the boiler.

A logbook must be maintained in the boiler room by the chief engineer or an operating engineer designated by the chief engineer. The log shall document when the boiler checks were made, who made the boiler checks, and what specific checks of equipment were made. This log shall be made available to the boiler inspector during inspections and at other times upon request of the boiler inspector.

Subp. 2. **Unsafe boiler plant.** If the chief engineer or operating engineer has found the boiler to be in an unsafe condition, the engineer shall notify the owner or employer and the chief boiler inspector as soon as possible. If the unsafe boiler is not immediately taken out of service, the chief engineer or operating engineer shall ensure that the boiler is continuously monitored by an operating engineer, 24 hours per day, until the division has either sealed the object, verified that the unsafe condition has been corrected, or determined that continuous monitoring is no longer required.

NEW

5225.1180 ATTENDANCE AT HIGH PRESSURE PLANT.

Subpart 1. **Attendance; plant of 0 to 50 horsepower.** At a minimum, a high pressure boiler plant of 0 to 50 horsepower, when in operation, must be visually observed at least once every 24 hours by an operating engineer. The operating engineer must document the findings and conditions in the boiler room logbook maintained pursuant to part 5225.1110.

Subp. 2. **Attendance; plant of 51 to 500 horsepower.**

- A. A high pressure boiler plant of 51 to 500 horsepower may be left in operation unattended by an operating engineer for no more than two consecutive hours, except as permitted by item B or subpart 5. The operating engineer must visually observe the operating condition of the boiler and appurtenances at least every two hours and document the findings and conditions in the boiler room logbook maintained pursuant to part 5225.1110.
- B. A high pressure boiler plant of 51 to 500 horsepower is exempt from the high pressure attendance requirements of item A if the plant is operated at low pressure. All boilers must either be shut down or shifted to low pressure. If a boiler is shifted to low pressure, it must have the following controls, safety devices, and conditions:
 - (1) the boiler must be equipped with high pressure controls and low pressure controls. These controls must be arranged so that they cannot be operated at the same time. The header connecting the low pressure controls to the boiler must have an isolation valve and a drain valve;
 - (2) the boiler must be equipped with fail-safe type safety controls for regulating pressure, water level, and fuel supply. Controls and safety devices must meet the minimum requirements for automatically fired boilers in Code Sections I, IV, and Controls and Safety Devices for Automatically Fired Boilers (CSD-1) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code;
 - (3) the boiler must be equipped with a low pressure header designed to prevent the system pressure from exceeding 15 psi. The low pressure header must have ASME code stamped safety valves set at 15 psi or less. The low pressure header safety valves must be constructed to ASME Code Section I or IV requirements;
 - (4) the low pressure header must be equipped with an isolation valve that isolates the header from the boiler or piping. The valve must be interlocked with the controls to prevent the valve from being opened when the system pressure is greater than 15 psi. The valve must be interlocked with the high

pressure controls to prevent the high pressure controls from operating when the valve is open;

- (5) the building in which the boiler is located must not be occupied by the public or employees except for custodial, maintenance, or security personnel;
- (6) an operating engineer must manually switch over the valves and controls between high and low pressure, enter the date and time of the switch in the boiler room logbook, and sign the logbook entry; and
- (7) when the boiler is operating on low pressure, an operating engineer must visually observe the boiler operating conditions at least once every 24 hours and record the conditions in the boiler room logbook, pursuant to part 5225.1110.

Subp. 3. Attendance; plant over 500 horsepower.

- A. A high pressure boiler plant of more than 500 horsepower, when in operation, requires constant attendance, except as otherwise provided in item B or subpart 5.
- B. The operating engineer in a high pressure boiler plant of over 500 horsepower may leave the boiler room for up to 30 minutes if all boilers are equipped with dual pressure controls and dual low water fuel cutouts, one of which must be the manual reset type. The operating engineer must stay within 500 feet of the boiler room at all times during the shift.

Subp. 4. [Repealed, 42 SR 251]

Subp. 5. Attendance; unoccupied plant. This subpart applies to plants with individual boilers that are 51 to 500 horsepower located in an unoccupied plant.

A high pressure boiler 51 to 500 horsepower may participate in the remote monitoring program if it complies with the requirements in items A to N.

- A. Boiler owners must submit an application in a manner prescribed by the commissioner to the department for review and approval to participate in the remote monitoring program for unoccupied plants.
- B. The building must be completely unoccupied and the boiler owner must demonstrate with substantiated data that the unattended boiler is located within a safe unoccupied radius.
- C. An operating engineer must perform the remote monitoring. The boiler owner must develop a written policy for safe response time for each individual boiler.

The operating engineer must be able to respond to any of the safety concerns listed in item L within the safe response time specified in the policy.

- D. The operating engineer must visually observe the operating condition of the boiler and appurtenances in person and document the findings and conditions in the boiler room logbook, maintained pursuant to part 5225.1110, at least once every 24 hours.
- E. When remotely monitoring high pressure boilers 51 to 500 horsepower, the operating engineer must continuously monitor the following boiler conditions:
 - (1) water level for steam boilers;
 - (2) boiler pressure;
 - (3) temperature for high temperature hot liquid;
 - (4) stack temperature;
 - (5) feedwater flow;
 - (6) make-up water flow for high temperature hot liquid;
 - (7) steam flow;
 - (8) fuel flow, at burner;
 - (9) gas/oil pressure;
 - (10) concentration of carbon monoxide in boiler room; and
 - (11) a video camera providing a continuous live video feed of the burner, sight glass, and pressure gauge. The live video feed must be continuously available to the operating engineer for remote viewing.
- F. The boiler must have two feed pumps that supply water to the boiler.
- G. A boiler firing with gas must have a flammable gas detection system in the boiler room with a visible and audible alarm. The alarm must trigger before the gas reaches an explosive level. The alarms must be visible and audible inside the boiler room and on the remote monitoring device. Located immediately outside the boiler room door, there must be:
 - (1) visible and audible alarms;
 - (2) an independent remote water level indicator; and
 - (3) remote boiler shutdown switches.
- H. Boilers using gas or liquid fuels must have a written fuel-rich condition shutdown procedure, which must be made available to the operators.
- I. Each boiler must have written standard and emergency operating procedures, which include testing of all safety devices at the manufacturers' recommended scheduled intervals.

- J. A diary must be maintained in the boiler room in a manner that prevents revisions, additions, or deletions. The diary must document, at a minimum, equipment start-up and shutdown times; equipment repairs; equipment inspections; equipment maintenance; equipment testing performed; and the name of the operating engineer documenting these actions, inspections, and tests performed. The diary must be provided to a national board-commissioned inspector upon request.
- K. The remote monitoring device and system must have a communication failure alarm. The operating engineer must return to the boiler room immediately upon notification of a communication failure.
- L. As recommended by the boiler manufacturer, the operating engineer must establish a primary set point that triggers an alarm and a secondary set point that automatically shuts down the boiler. The primary set point must trigger an alarm if the boiler conditions fall outside of the boiler's normal operating conditions but are within an operating range in which the boiler is safe to operate temporarily. The secondary set point must trigger the boiler to automatically shut down when the boiler conditions are outside of safe operating conditions. The following items must have primary and secondary set points:
 - (1) high and low water level for steam boilers;
 - (2) high and low boiler pressure;
 - (3) temperature for high temperature hot water heating;
 - (4) concentration of carbon monoxide in boiler room;
 - (5) fuel flow;
 - (6) steam flow;
 - (7) gas/oil pressure; and
 - (8) flammable gas detection.

A flame sensor must trigger an alarm when a flame is not detected and automatically shut down the boiler.

- M. A national board-commissioned inspector must conduct both an initial internal and external inspection of the boilers to determine compliance with this subpart to qualify for remote monitoring. The internal inspection must be conducted while the boiler is not in operation. The external inspection must be conducted while the boiler is in operation. Annually thereafter, the national board-commissioned inspector must conduct internal and external inspections to ensure continued compliance with this subpart. The inspector must document the name of the water treatment company and the name of the certified water treatment specialist. The water treatment specialist must be certified to treat,

test, and monitor the boiler water. Inspection reports must be submitted to the chief boiler inspector.

- N. The water treatment specialist must establish a water treatment program that contains boiler water quality parameters. The specialist must monitor the program at least every 60 days by testing the boiler water and reviewing the operating engineer's test results. The operating engineer must test and document the results of the boiler water at least every 24 hours. The test results must be provided to the specialist, the national board-commissioned inspector, or chief boiler inspector upon request. The boiler owner and operating engineer are responsible for ensuring that the boiler meets all of the requirements of the remote monitoring program identified in subpart 5. If the boiler owner or operating engineer determines that the boiler fails to meet the requirements of the remote monitoring program at any time, the owner or engineer must immediately comply with the constant attendance requirements in subpart 3 until all deficiencies are corrected and restored to compliance with the remote monitoring program. All deficiencies and subsequent corrections must be documented by the operating engineer in the diary. If the chief boiler inspector or national board-commissioned inspector determines that the boiler fails to comply with the requirements of this subpart, the boiler is disapproved for the remote monitoring program and must begin immediate compliance with the constant attendance requirements identified in subpart 3. Reinstatement in the remote monitoring program is granted to the boiler owner by correcting the deficiency and obtaining verification of the correction from the national board-commissioned inspector. Evidence of the correction and verification must be submitted to the chief boiler inspector prior to reinstatement.

5225.1200 INSPECTORS.

Subpart 1. **License requirement.** All inspectors whether jurisdictional or in the employ of insurance companies performing inspections in Minnesota shall possess a National Board of Boiler and Pressure Vessels Inspectors' Commission issued by the National Board of Boiler and Pressure Vessel Inspectors, and a Minnesota certificate of competency and shall place on inspection reports the serial number of their Minnesota state certificate of competency. The serial number of the applicant's national board commission must be registered with the division before or at the time of application for the Minnesota certificate of competency. A Minnesota state certificate of competency is issued by the division according to Minnesota Statutes, section 326B.952, subdivision 2.

5225.1350 PROPERTY DAMAGE OR PERSONAL INJURY REPORT.

Insurance inspectors or owners of boilers shall make a written report to the chief boiler inspector of incidents involving boilers and pressure vessels covered under this

chapter that result in personal injury, destruction of the object, any property damage, or repairs not of a routine nature. These incidents shall be reported on the National Board of Boiler and Pressure Vessel Inspectors, Incident Report form.

INSPECTIONS

5225.2050 MAXIMUM ALLOWABLE WORKING PRESSURE.

The maximum allowable working pressure for boilers and pressure vessels must not exceed that determined for those objects in Section I for high pressure boilers, Section IV for low pressure boilers, or Section VIII for unfired vessels of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code.

5225.2100 STAMPS ON BOILER AND PRESSURE VESSELS.

Every boiler or pressure vessel, unless specifically exempted by Minnesota Statutes, section 326B.988, for use in this state must conform in every detail to the boiler and pressure vessel laws of the state as provided in Minnesota Statutes, chapter 183, and this chapter. Each boiler or pressure vessel must be constructed in compliance with and stamped with the respective American Society of Mechanical Engineers Code Symbol Stamp, or international code symbol accepted by the National Board, and the National Board symbol registration number or the Minnesota Special (MINN. SPC). Stamping must be witnessed by an Authorized Inspector. Information as to construction stamp requirements shall be provided to contractors by the chief boiler inspector. The chief boiler inspector may, at the request of the manufacturer, designate any authorized inspector to make the shop inspection, for which the manufacturer shall pay the required fee pursuant to part 5225.8600, subpart 4, plus travel expenses.

All owners of new or used boilers shall notify the division before the installation is completed. Before the equipment is put into service, hydrostatic testing must be applied to the boiler and appurtenances and witnessed by a commissioned inspector who holds a Minnesota certificate of competency. If the boiler and appurtenances are in conformance with adopted standards, the inspector must file the results with the chief boiler inspector and a certificate of inspection will be issued for that object.

5225.2300 EXCEPTIONS TO THIS CHAPTER.

The objects described in Minnesota Statutes, section 326B.988, clauses (1) to (24), are exempt from this chapter.

5225.2500 LOW WATER DEVICES.

Subp. 3. **Requirements.** The following must be equipped with a low water cutout that will shut off the fuel supply in case of a low water condition:

- A. each automatically fired steam boiler; and
- B. each automatically fired hot water heating boiler or other hot liquid boiler plants of two or more boilers with individual isolating valves connected to a common header with a total heat input exceeding 750,000 Btu per hour input.

Subp. 4. **Flow-sensing device required.** The following must have a flow-sensing device installed in the outlet piping instead of the low water fuel cutoff required in subpart 3 to automatically cut off the fuel supply when the circulating flow is interrupted:

- A. a coil type boiler plant exceeding 750,000 Btu; and
- B. a watertube boiler plant with heat input greater than 750,000 Btu per hour requiring forced circulation to prevent overheating of the coils or tubes.

5225.2600 REPAIRS AND ALTERATIONS; REPORTING.

Subpart 1. **Prior notice of repair or alteration.** The owner or person in charge of a boiler, steam generator, or pressure vessel shall notify the Chief Boiler Inspector or, if the object is insured, the owner or person in charge shall notify the insurer, before each welded or riveted repair or any alteration is made to the pressure containing parts of a boiler or pressure vessel. The authorized inspector will review and accept or reject the computations for the safe working pressure of the repaired or altered object.

Subp. 2. **Standard of repairs.** The National Board of Boiler and Pressure Vessel Inspectors' repair (R) stamp and current Repair Certificate of Authorization are required for performing any welded or riveted repairs or any alterations to any boiler or pressure vessel subject to inspection as specified in Minnesota Statutes, sections 326B.952 to 326B.998.

BOILER SAFETY

5225.4100 SAFETY VALVES.

Every high pressure or low pressure boiler must have at least one safety valve. A high pressure boiler of more than 500 square feet of water heating surface must have two or more safety valves. All safety valves must meet the requirements of Section I, IV,

or VIII of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, and be so stamped, and be set no higher than the maximum allowable working pressure on the inspector's certificate for that boiler.

Every safety valve must be connected to the boiler independent of any other connections, and attached as close as possible to the boiler, without any unnecessary pipe or fitting and must stand in an upright position. No valve of any description may be placed between the required safety valve or valves and the boiler, nor on the discharge pipe between the safety valve and the point of discharge. All safety valves must discharge at a point of safety not less than seven feet from running boards, platforms, or adjacent areas. No reduction in pipe size is allowed in discharge piping from a safety valve. The discharge pipe must be of sufficient size to allow complete discharge without back pressure.

5225.4200 WATER GAGE.

When the boiler operating pressure exceeds 100 pounds per square inch, the water gage glass must be fitted with either a gate-type or plug-type valved drain to a safe discharge point.

If the lowest water gage shutoff valve is more than seven feet above the floor or platform from which it is operated, the operating mechanism must indicate by its position whether the valve is opened or closed. Installation must meet the requirements of Section I of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code for high pressure boilers or Section IV for low pressure boilers.

5225.4300 WATER COLUMN SHUTOFFS.

When shutoffs are used in pipe connections between a boiler and water column or between a boiler and the shutoff valves required for the gage glass they must be either outside-screw-and-yoke or lever-lifting type gate valves or stopcocks with levers permanently fastened and marked in line with their passage, or other through-flow construction to prevent stoppage by deposits of sediment. These valves must indicate by the position of the operating mechanism whether they are in open or closed position; and the valves or cocks shall be locked or sealed open. Where valves are used they must be a type with the plug held in place by a guard or gland.

The steam and water connections to a water column, including all pipe, fittings, valves, and drains must be readily accessible for internal inspection and cleaning by providing a cross or fitting with a back outlet at each right-angle turn, or by using pipe bends or fittings which will permit the passage of a rotary cleaner. The water column shall be fitted with at least a three-fourths inch pipe size valve drain with a suitable connection to a safe discharge point.

5225.4400 STEAM GAGE.

For steam boilers the steam gages must meet the requirements of Section I for high pressure boilers, and section IV for low pressure boilers of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code to correctly record pressure.

Each steam gage must be connected to a siphon of at least one-fourth inch pipe size and be fitted with a valve provided with a tee or lever handle arranged to be parallel to the pipe in which it is located when the valve is open. If the pipe is longer than ten feet, a shutoff valve or valve arranged so that it can be locked or sealed open may be used near the boiler.

The dial of the steam gage must be graduated to approximately double the pressure at which the safety valve is set but in no case to less than 1-1/2 times this pressure.

5225.4500 VALVES AND FITTINGS.

Valves and pipe fittings must conform to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code which adopts American National Standards Institute standards for the maximum allowable working pressure. Fusion welded joints are permitted if the welding procedure and operator are qualified as required in Section IX of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code.

All valves and fittings on all feedwater piping from the boiler up to and including the first stop valve and the check valve must be equal at least to the requirements of the standard accepted by Section I of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code for pressure 1.25 times the maximum allowable working pressure of the boiler.

All valves and fittings for feedwater piping between the required check valve and the globe or regulating valve, and including any bypass piping up to and including the shutoff valves in the bypass, must be equal at least to the saturated requirements set out in Section I of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. The valves and fittings must have a pressure rating at least equal to the expected operating pressure required to feed the boiler for a saturated steam temperature corresponding to the minimum set pressure of any safety valve on the boiler drum or for the actual temperature of the water, whichever is greater.

Valves and fittings made of any material permitted by I of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code for pressure ratings of 125 pounds or more and marked as required by the code may take up to 20 percent reduction in pressure rating when used for feed line and blowoff service.

5225.4700 COMMON MAIN CONNECTION.

When two or more boilers are connected to a common steam main, the steam connection from each boiler having a manhole opening must be fitted with two stop valves having an ample free-blow drain between them. The stop valves installed on high pressure steam boilers must consist of either one automatic nonreturn valve, set next to the boiler and a second valve of the outside-screw-and-yoke type; or two valves of the outside-screw-and-yoke type. The free blow drain must ensure complete removal of all condensate and steam from between the two stop valves.

5225.4800 BLOWOFF PIPING; VALVES AND FITTINGS.

Each boiler must have a bottom blowoff pipe fitted with a valve or cock in direct connection with the lowest water space practicable.

All fittings between the boiler and valves must be of steel for pressure over 100 pounds per square inch. For pressures up to 200 pounds per square inch cast iron valves may be used if they meet the requirements of Section I of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, which adopts the American National Standards Institute Standard for 250 pounds; and if of steel must be equal to the requirements of Section I of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, which adopts the American National Standards Institute Standard. For pressures over 200 pounds per square inch the valves or cocks must be of steel and at least equal to the requirements of Section I of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code which adopts the American National Standards Institute Standard.

5225.4900 BLOWOFF PIPING.

On all stationary boilers, when the allowable working pressure exceeds 100 pounds per square inch, each bottom blowoff pipe must have two slow-opening valves, or one slow-opening valve and a quick-opening valve or a cock complying with Section VII of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. The quick-opening valve, if used, must be located nearest the boiler.

The bottom blowoff pipes of every traction and/or portable boiler must have at least one slow-or-quick-opening blowoff valve or cock conforming to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section VII requirement.

Blowoff valves and cocks must be located in a convenient and accessible place, using extension valve stems if necessary to secure safe operation.

5225.5000 FEED PIPING AND CHECK VALVE.

The feed-pipe must be provided with a check valve near the boiler and a valve or cock between the check valve and the boiler. When two or more boilers are fed from a common source, there must be a globe or regulating valve on the branch to each boiler between the check valve and the source of supply. Wherever globe valves are used on feed piping, the inlet must be under the disk.

A combination stop-and-check valve in which there is only one seat and disk, and a valve stem is provided to close the valve when the stem is screwed down, must be considered only as a stop valve, and a check valve must be installed as provided in the first paragraph of this part.

5225.5100 FEEDWATER SUPPLY.

A high pressure boiler having more than 500 square feet of water heating surface (50 BHP) must have at least two means of feeding. Each source of feeding must be capable of supplying water to the boiler at a pressure of three percent higher than the highest setting of any safety valve on the boiler. For boilers that are fired with solid fuel not in suspension, and for boilers whose setting or heat source can continue to supply sufficient heat to cause damage to the boiler if the feed supply is interrupted, one such means of feeding must not be susceptible to the same interruption as the other, and each source must provide sufficient water to prevent damage to the boiler.

When electrically driven feed pumps are used and there is no other reliable independent source of electrical supply, there must be maintained ready for service steam-driven feed pumps or injectors (inspirators) of sufficient capacity to safeguard the boilers in case of failure of electric power.